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THE SEASONAL CHANGES IN THE COMMON SQUIRREL.

By OLDFIELD THOMAS.

ALTHOUGH everyone has noticed the differences in colour shown by our Common Squirrel at different seasons in the year, no exact account has ever been published of the methods and dates of the various changes, and certainly, so far as I know, no one has been aware either of the regularity with which the changes occur, or of the peculiar manner in which different parts of the animal undergo their annual changes at different times of the year.

Thanks to the kindness of Mr. J. C. Mansel-Pleydell, of Whatcombe, near Blandford, Dorsetshire, the British Museum has obtained a large series of Squirrels from his estate, killed all round the year, and showing the changes so perfectly that I am enabled to make out the dates and methods of the variations with some approach to exactness. It may be noted that these specimens were obtained at intervals of six or seven weeks for a year, starting in April, 1894; and that then—two somewhat important gaps occurring in the series at the time of the spring and autumn moults—two specimens were sent every week from April 18th to May 25th, and again throughout October, 1895. In all the number of skins amounts to fifty-four.

Curiously enough, specimens killed in the fine and warm spring of 1894—on April 18th—are practically identical with others killed on the same day in 1895, in spite of the exceptional

severity of the spring of the latter year. Nor is the commencement of the long frost of January to March, 1895, in any way specially marked in its effects as compared to the mild autumn and early part of winter. No direct correlation between weather and fur can therefore be established.

In the large number of skins examined, nothing is more striking than the very small proportion which are of any material assistance in making out the chief facts, and it would appear that the actual changes are accomplished very quickly in any given individual, so that it is difficult just to catch them in the change. About seven or eight skins only of the fifty-four are really in a condition to show anything of importance; the others merely confirm the conclusions arrived at. Indeed, the fact of an autumn moult was overlooked and denied until one specimen received later than the rest conclusively proved its occurrence. This mistake could not, however, have been made had the general series come from a colder place than Dorsetshire, where, owing to the mild winters, little variation of colour is caused by the autumn change of fur.

It may also be noted that young individuals should be altogether ignored, for until after the first year they do not apparently settle down to the regular cycle of changes, but are quite erratic, and unlike the adults.

Before entering into details, I may first state briefly the conclusions to which this series of skins has led me.

I. There are two annual changes of fur in the Squirrel, so far as its body and limbs are concerned; but

II. The long hairs of the brush of the tail are only changed once, in the autumn, the spring change being practically suppressed.

III. The tail becomes regularly, and in all individuals, quite white in summer,* and this change is effected by the gradual bleaching of its long hairs, and not by their replacement.

The difference between the body and the tail in their fur changes is a most remarkable and unexpected fact, to which at present I know no parallel instance. It will, however, very

* It may be noted that a special name for the British Squirrel, based on this peculiarity, has been in existence for more than a century:—"Common Squirrel, beautiful variety with milk-white tail."—Pennant, Hist. Quadr. ii. p. 406, 1781. *Sciurus vulgaris leucurus*, Kerr, Linn. An. K. p. 256, 1792.



probably be found to occur in many other species, when equally detailed observations have been made on them.

To justify the above conclusions, the different parts of the body may best be considered separately, taking the most obvious first.

I. Tail-hairs.

In August and September there become visible on the tail, among and gradually displacing the ragged white hairs of the summer, a handsome set of long shining blackish-brown hairs, which have hardly attained their full length before they begin to lose their colour, fading gradually during the winter through various shades of brown, pale brown, dull yellowish brown, straw colour, and finally, by June, July, and August of the following year, becoming nearly or quite white.* Then in their turn they are displaced, in September, by the new blackish hairs of the succeeding coat.†

Although, as just stated, the long hairs only become visible on the shedding of the old ones in August and September, their extreme tips protrude from the skin much earlier, and may be occasionally found in July skins, forming a short blackish covering to the tail among the roots of the long white hairs of the previous year's coat.

In an intermediate condition, well represented by a skin dated Aug. 19th, the tail may be more or less piebald, with the middle third of its breadth black, fringed on each side with the ragged white hairs of the old coat.

† It will be observed that *red* is a colour not mentioned in the description of the tail, and it is a curious fact that as yet I have not seen a single adult red-tailed British Squirrel. Should any readers of 'The Zoolologist' come across such specimens, which most people vaguely suppose to be in a majority, they are requested to send them in the flesh to the writer at the Natural History Museum. Mere reports of red-tailed Squirrels seen wild are of little use, as, owing to the deceptive appearance presented by the red flanks and constantly moving tail, many specimens seem in life to have red tails which after death prove to have nothing of the sort. Young specimens, however, often have red tails, and this would tend to show that, like their continental relatives, the British Squirrels were formerly red-tailed when adult.

* A similar case of colour bleaching during life was described by me in a Nyasa Squirrel (*Sciurus mutabilis*) in 1894 (P. Z. S. 1894, p. 140), not knowing how much nearer home the same phenomenon might be observed.

The bleaching of the colour of the tail takes place most rapidly at its tip, gradually proceeding bodywards. Naturally there is some variation between different individuals as to the degree of bleaching attained at any date, so that in the winter months some Squirrels may be seen with brown and others with whitish tails. But as every individual passes through the same series of changes, only varying the date, there is really far less true variability—that is, difference between one individual and another—than a casual observer would at first suppose.

Concurrently with their bleaching the hairs wear down or fall out, so that the brush gradually becomes thinner and poorer, until the new one attains its full length in September. The growth of the latter takes place from the body towards the tip, the terminal hairs being the last of the white summer coat to be superseded.

It will be noted that the bleaching takes place mainly in the winter and early spring, so that it cannot be assigned to the special action of the summer sun.

This description refers entirely to the long hairs of the tail, which are the only ones that affect its general colour, and which stay in place a full year before they are changed in correspondence with (though rather before) the autumn moult of the body-fur. Whether there is any regular growth of tail-hairs in correspondence with the development of the summer body-coat is doubtful. One skin, obtained on May 24th, seems to show that some short blackish hairs appear on the tail between the long ones just at the date of the spring body-moult, which hairs are not to be found a little later in full summer skins, and have perhaps been moulted as soon as developed. Further observation is needed on this point.

II. *Ear-tufts.*

The hairs of the ear-tufts follow very much in their changes those of the tail. The terminal hairs of the ear-tip, belonging, like the brush-hairs, to the autumn coat, lengthen and become noticeable in September, attaining their maximum about January. Like the tail-hairs, they steadily bleach all the time from their original dark brown colour, and get white, thin, and poor in May and June. In most specimens they have altogether disappeared by July, although in rare cases a few

straggling white hairs may remain in position even up to the time that in September the tips of the new tufts begin to show themselves. When tufts of fair size do persist into August, their pure white colour renders them very striking objects.

Such hairs as may grow on the ear-tips at the time of the spring body-moult only become visible on the fall of the long tufts, and always remain quite short. The short hairs may in fact be compared to the aborted summer tail-covering already referred to, just as the long tufts of the autumn suit correspond to the autumn brush-hairs of the tail.

III. Head, Body, and Limbs.

The head, body, and limbs, unlike the tail, instead of having the summer one of the two coats practically aborted, have two new and equally developed coats each year, the summer one rich rufous, and coarse in texture; the winter one greyish brown, long, soft, and warm.

So far as Mr. Mansel-Pleydell's specimens show, the whole spring change of coat is begun and completed during the six weeks following the 20th of April. Up to about this date no trace of the fresh coat can be seen, but then it begins to appear, first on the muzzle and tips of the fingers and toes. Spreading backwards from the first-named part, and bodywards from the others, the new coat gradually supersedes the old one throughout, the face, hands, and feet being the first to change, then the neck, flank, and sides, while the old fur remains last on the rump and backs of the thighs. A patch on the occiput, however, is often later than the back in changing; while, on the other hand, a small patch on the centre of the rump sometimes changes first of all. By May 24th the whole change may be finished, as is the case with one specimen; while in another, killed the same day, only the anterior half of the back has changed.

As to colour: the new coat, when first up, say in June, is at its richest and best—bright rufous on the face, withers, flanks, and limbs, but nearly always duller and greyer or brownish on the crown between the ears, and on the posterior back. There is, however, some individual variation in the relative proportions of the grey and rufous.

From a fully changed end of May specimen to one killed in September, no appreciable difference in the colour, quality, or

length of the fur can be perceived; but towards the end of October another complete change of fur takes place, but one which, owing to the very slight change of colour it involves, is most difficult to observe, and has been hitherto quite overlooked. The difficulty is also increased by the fur changing more uniformly all over the body, and not in the prominent patchy way characteristic of the spring moult. The exact course of the change, both for this reason and for want of specimens killed just at the right moments, cannot be described in detail.

The new coat, when fully up, is long and soft, and composed of hairs which are inconspicuously annulated with brown and dull white; so that, though the general tone is, in Dorsetshire at least, not so very unlike that of the summer coat, its constituents are essentially distinct, for the rufous summer hairs are quite unannulated.

This difference in the constitution of the colours involves a further interesting change, for while *red* (whether of summer coat or of continental Squirrels' tail and ear-tufts) is not apparently susceptible to bleaching, *blackish brown* (*e.g.* English Squirrels' tails and ear-tufts) is strikingly so; and we accordingly find that the winter coat, with its blackish brown basis, bleaches steadily throughout the winter, like the tail. As a result, in February and March skins, the whole animal, from nose to tip of tail (but not the *rufous* limbs), is bleached to one uniform dull yellowish or drab tint.

Then in May, while the tail goes on bleaching in the same direction to white, the corresponding change in the body-coat is arrested by the coat itself being abruptly changed for the new suit of *rufous*.

IV. Palms and Soles.

The palms of the hands and soles of the feet are in summer entirely naked, but about November they gradually become clothed between and behind the pads with short woolly hairs, which fall off again about April. The palms are on the whole much less thickly clothed than the soles, and in some specimens remain almost or quite unclothed through the winter.

The following calendar of changes will show in what state Squirrels may be expected to be found at any given time; but it cannot be too much insisted on that the whole of these

remarks are based on Squirrels from Dorsetshire, one of the mildest of English counties, and that no others have been examined for fear of complicating the results. Variations in the time of the changes may be expected to occur at other places, especially in the north, and there will also no doubt be some local variation in the colours themselves :—

January and February.—Ear-tufts long, brown. Body-coat long, soft, greyish rufous-brown. Limbs rufous. Tail grey-brown, like back, but bleaching, especially terminally, to whitish. Palms and soles hairy.

March and April.—As above, but the colour of ear-tufts, back, and tail more bleached.

May.—Bleached and ragged pelage of body and limbs changed for summer suit of rich rufous. Ear-tufts and tail continuing to bleach and become poorer.

June and July.—Summer dress: rufous head, body, and limbs; white thinly-haired tail; ear-tufts disappearing, white so long as they remain; palms and soles naked.

August and September.—New ear-tufts and tail-hairs, both blackish brown, appearing. Body-coat still rufous, but less rich in tone.

October.—Body-coat changed for winter suit. Ear-tufts lengthening. Tail commencing to bleach.

November and December.—Winter dress: brownish grey on head and body, limbs more or less rufous; fur long, thick, and soft, inconspicuously annulated. Ear-tufts long, brown. Tail blackish or brownish, scarcely beginning to bleach. Palms and soles hairy.

In conclusion, I may remark that the above wonderful changes in the British Squirrel are, both in effect and complexity, quite unparalleled throughout the mammals of the world, so far as I am aware. Had any such peculiarity occurred elsewhere it must have been noticed before, but being at our very doors no one has till now commenced any serious investigation; and the subject has been dismissed with a passing remark on the "variability" of our Common Squirrel.

ORNITHOLOGICAL NOTES FROM RYE.

BY BOYD ALEXANDER.

WITH the end of September migration practically came to an end. While the movement lasted the coast was filled with bird-voices familiar to the shore. At low water parties of Gulls, including both the Herring and Black-headed species, immature and adult, appeared on the sands, while, amongst all this predominant white plumage, the black backs of a few *Larus marinus* often riveted the eye; but the majority of the last-named kept out at sea, following in the wake of trawlers in expectation of seizing the small fry that were thrown overboard. And when the weather became warm and fine, and bits of rolling cloud threw bright nigrescent shadows upon the sands, and the sea was full of one limitless drowsy tone, the Gulls lined the water's edge in clustering hundreds, choosing for their large webbed feet the portion of the sand that was smooth and not freckled by many stones, in preference to that which it had become the mould of tiny ebbing waves. On a spot like this they stood for a long while motionless, looking all dazzling white—things of rare marble in the tide's ever-changing and varied gallery. Further inland on the sands the rattling cry of the Turnstone, the plaintive notes of the Ringed Plover, and the tremulous whistle of the Dunlin would fitfully strike the ear.

Again, further inland still, beyond the sea-wall, the Lydd Beach became for a brief time the resting station of many Curlews, whose cries were more persistent and noisy than those of all the other shore birds put together. The thick and dark nights, consequent on bad weather experienced throughout September, rendered observation of the migration flights southward of many species impossible, and it was only by the occurrence of stragglers that any idea of the progress and order of these flights could be arrived at.

I take the following notes, which may be of interest, from my diary during my stay this autumn on the Rye coast:—

Aug. 24th. Strong south-westerly wind. Three big flocks of Curlew, each numbering on an average 200 birds, have come to the Lydd Beach. They appeared from the north-eastward.

Aug. 25th. Light westerly wind, showery. The flocks of

Dunlin on the shore are considerably augmented. They frequent spots where the sand is of a muddy nature, retiring at high tide to the stretches of sea-pink near the harbour, and to brackish pools. Many of these Dunlin are still far from completing their moult. Large numbers of Linnets invade the poor pieces of land near the coast. The majority are young birds in a moulting condition, the breasts of many being marked with the chocolate colour of first youth.

Aug. 26th. Light westerly wind, fine. Three immature Green-shanks were obtained at the harbour to-day, and a pair of Wood Sandpipers (*Totanus glareola*), along one of the dykes. The occurrence of the last-named species, locally known as "Autumn Snipe," is very irregular. The course of their migration seems hardly to touch this part of the coast. During the autumn one or two stragglers are the most that appear along the dykes. As opposed to "Autumn Snipe," the Common Snipe is known here as "Full Snipe."

Aug. 27th. North-westerly wind, fair. At eight o'clock this morning two fine male Ruffs were shot on a small reed-girt pond. When first seen they were making in a south-westerly direction. Two large flocks of Sanderlings (*Calidris arenaria*) have arrived on the shore. Next to the Dunlins they are by far the most numerous of the shore birds here. Like the Purple Sandpiper, these birds choose rather as a time for feeding when the tide is coming in. At such times they are to be seen racing along the edge of the incoming water, making it often very hard to gain on them and difficult to distinguish them from the fragments of the swift-sliding surf through which they pursue their way. For the first time this autumn I flushed to-day from a small reed-bed three Green Sandpipers (*Totanus ochropus*). These birds on migration fly at a considerable altitude, pitching almost vertically down to their feeding-grounds, when towards sunset they become very noisy with their sharp "wheet-wheat, wheat-wheat" cries. Sheltered ditches whose banks are bordered with mud and rushes are now favourite resorts. The same kind of spots are also visited by the Wood Sandpiper. The reed-beds are full of young Reed and Sedge Warblers, as well as Reed Buntings, the majority of the latter adults, the males being in a state of losing the black on head and throat. This motley crew flitted low in front of me, the Reed Buntings making with their slender long-shaped bodies

tiny crosses of the waving reed-stems, while in higher strata coursed countless numbers of young Swallows. Single Whin-chats, invariably young females, are in the pasture fields near the coast. In the Cranbrook neighbourhood this species is found on migration in autumn, but even then very irregular in its appearances. On Aug. 20th a small flock of six birds (the first since 1893) appeared in a fallow field near the town. They caught their prey after the manner of Flycatchers, being very busy just at dusk in obtaining it, retiring for the night to a neighbouring turnip-field. All of these birds were young males, a fact which I have found to be the case on several former occasions. The rule with this species on migration seems, therefore, to be that the males go together, while the females keep separate. An extraordinary influx of Yellow Wagtails took place this evening: the bean and stubble fields were literally alive with them, while many perched, after the manner of Swallows, on the telegraph wire near the sea-wall. Just now the males of this species are very quarrelsome, and may constantly be seen fighting among themselves.

Aug. 27th. Light north-westerly wind. The Yellow Wagtails are edging eastward. Towards evening large numbers had concentrated around Dungeness, prior no doubt to crossing the Channel.

From Aug. 28th to Sept. 25th flocks of Starlings peopled the vicinity of the coast. I watched them daily increasing till they assumed immense proportions. From early morning to evening, especially when the weather was bad and a strong south-west wind blowing, wonderful and fascinating flights were executed by these flocks, which had the appearance of mottled aerial monsters swimming high above the ground in devious courses through the air—now close—now far distant, seeming mere bits of driven smoke toned with constant changing lights like those on wind-waved ripples, but always edging to the northward. These flights form an interesting study. I have found that they are invariably resorted to when on migration and on nearing the coast, when the country generally presents an open and unenclosed view for many miles. They are undertaken to provide beacons of safety to the numerous stragglers that must necessarily lose their way during bad weather. On the other hand, where the country is close and woody, the voice rather than flight is far more resorted to as a means of attraction. On an autumn evening, when a flock betakes

itself to roost in some well-conditioned plantation, or before starting on migration, a few leading birds will station themselves on a lofty tree-top and there commence singing at the top of their voices, starting with long-drawn whistles. Every minute stragglers keep dropping in, and then, when the flocks become formed, a general advance is executed.

Aug. 29th. Light westerly wind. A large number of Black-headed Gulls (*Larus ridibundus*) of the year came to the sands early this morning. No doubt these birds belong to the colony at the Hoppen Petts, near Lydd. I am told that these pieces of water are deserted by them every autumn with marked regularity. There is a saying down here that the "Crocker," as this Gull is locally called, leaves the Hoppen Petts on Romney Fair-day, which falls on August 21st.

Aug. 21st. Several Common Sandpipers (*Tringa hypoleucus*) appeared to-day, and a Black-tailed Godwit (*Limosa ægocephala*), immature male, was shot.

Sept. 2nd. A Broad-billed Sandpiper (*Tringa platyrhyncha*), immature male, was obtained at the harbour out of a flock of Dunlin. This specimen, together with the female of this species obtained at the same place, and under similar circumstances, last December (Zool. 1895, p. 449), brings the recorded Sussex-killed specimens up to five.

Sept. 6th. Young Swallows and Martins are in great strength, skimming to and fro over brackish pieces of water, or basking on the sands at low tide. Towards evening these large bands had moved eastward along the coast and were within two miles of Dungeness Point. Lapwings have put in an appearance, for the first time since the breeding season, invading the fallow fields in large numbers. The Lapwing is now very silent, and it is only at night, when disturbed, that he gives vent to a few random crack-toned notes, bearing a striking contrast to the clear ones uttered during the breeding season, when he seems plainly to be telling the intruder within his nesting circle to "gō tō, gō tō, gō tō." Another Broad-billed Sandpiper (*Tringa platyrhyncha*), immature female, was shot at Littlestone out of a flock of Dunlin. This, I believe, is the first instance on record of this species having been obtained in Kent.

Sept. 7th. A Little Stint (*Tringa minuta*), female, from a flock of Dunlin. Not very often met with here, and still less during

the passage northward in spring. I have a pair in perfect summer plumage shot at the harbour in April, 1890. A few Grey Plovers (*Squatarola helvetica*) along the shore where the sand is muddy. This morning my dog caught a Moorhen amongst some rushes of a pond. The bird was unable to fly, both wings being in a complete state of moult. A similar instance in the case of the Landrail was cited at a recent meeting of the British Ornithologists' Club.

Sept. 8th. Light south-westerly wind, fine. Several young Knots have come.

Sept. 9th. Whimbrel (*Numenius phæopus*) on the Lydd Beach for the first time. Numbers of Meadow Pipits (*Anthus pratensis*) are invading the dykes and shallow pieces of water. Golden Plover, in excellent condition, have also arrived. A Wryneck, adult male, on shore, and a few Lesser Terns beating round the mouth of the harbour. A small flock of Redstarts, two of which sang fitfully throughout the day. Their songs were of a short duration, and not unlike the commencement of the Robin's autumn song.

Sept. 10th. Wind south-westerly; very rainy. The large flocks of Lapwings already about have become greatly increased. A small flock of Kentish Plovers (*Ægialitis cantiana*) on the beach bank near the harbour. I have never found the Kentish Plover amongst the flocks of Dunlin unless numbers of Ringed Plovers are present; otherwise it keeps by itself. During autumn this bird exhibits none of that restlessness and timidity so marked in these other two species. It will sit dozingly for a long period on a spot where the beach has silted up, and there wait patiently for the tide to reveal new-born things; not so the greedy and restless Dunlin, who hurries off from his station amongst the sea-pink ere the tide has had time to turn, all eager to gather the first fruits. On the shore-line, where food is plentiful and easily obtained, the Dunlins are wide-awake and restless in the extreme; but when a spring-tide covers the sand they resort to brackish pools possessing scanty food, and here the preoccupation they display in searching for it renders a close approach easy; and interesting it is to watch their quaint movements, now sidling along almost knee-deep in the water, then stopping for a moment motionless, with humped backs, like so many little aged creatures, then arching their wings to the full extent above their bodies, as

if practising for a ready flight, then resuming their labours in search of food, totally immersing at times their heads in the still water.

Sept. 11th. Stormy; south-westerly wind. A single male Blackcap Warbler secured. The plumage of this specimen struck me as being somewhat different to the plumage of those I have taken in summer. The mantle and shoulders possessed a distinctly olive-green tinge, while the central feathers of the belly were of a rich cream colour. Numbers of young Swallows, and with them a few Sand Martins.

Sept. 12th. Cloudy; south-westerly wind. Large numbers of Sand Martins, both old and young. Twenty Godwits were seen to-day in company with Curlews.

Sept. 15th. Strong south-westerly wind. The majority of Swallows and Sand Martins have left.

Sept. 20th. A pair of Black-tailed Godwits. The night clear and beautiful, with full harvest-moon. Between 9 p.m. and midnight a large flock of Starlings, three small companies of Green Sandpipers, two considerable flocks of Golden Plover, and a small one of the Grey Plover, passed over. From the sound of their voices a south-westerly direction was taken.

Sept. 21st. Strong south-westerly wind and rainy. A single Curlew Sandpiper (*Tringa subarquata*) (female) was obtained to-day, while two Grey Phalaropes (*Phalaropus lobatus*) were seen on the midrips.* Small parties of Redshanks (*Totanus calidris*) arrived. They included both adults and immature birds; moult almost completed. I obtained to-day a young male of the small race of Dunlin, and also, out of the same flock, one of the larger race. The former had the following measurements:—Length 7 in., culmen 1·1 in., wing 4·4 in., weight 1½ oz. The latter bird was an adult with winter dress almost assumed. Length 8·75 in., culmen 1·45 in., wing 4·5 in., weight 2 oz. The plumage of the former altogether darker than the ordinary form of Dunlin, while the markings on breast and flanks brighter and more condensed. I have observed that this small race is much later than the majority in arriving on the coast during autumn, and fonder of obtaining food near brackish water and on oozy flats than on the shore-line. Among the large flocks of Dunlin now on the sands,

* A name given to shallow pieces of water on the Lydd Beach.

I frequently come across birds which have a great amount of rufous tinge in their plumage, especially on the head and breast, quite distinct, in my opinion, from that assumed by the bird of the year; and I have met with the former still more frequently throughout the summer. These, no doubt, are one-year-old birds that will assume next spring the nuptial dress. Therefore, strictly speaking, the Dunlin passes through three well-defined stages in variation of plumage before maturity is reached—that put on by the bird of the year, which has little or no rufous tinge; that having the rufous tinge in a marked degree, which comes after the first spring; and, lastly, the nuptial dress itself, when this rufous colouring is to a great extent lost.

Sept. 22nd. Very stormy; a stiff gale from the south-west.

Sept. 23rd. Strong westerly wind. Two more Curlew Sandpipers (males). Several Green Sandpipers about. The majority of Yellow Wagtails have disappeared.

Sept. 24th. Strong south-westerly wind. A pair of Wood Sandpipers along one of the dykes, while a Grey Wagtail was observed for the first time to-day. A number of Kingfishers close to the shore. Four Black Terns (immature) appeared. They kept hawking over a grass-field all day long. These birds are seldom met with on this part of the coast.

Sept. 25th. Very rainy; a strong south-westerly gale. The Black Terns are still about. Another Curlew Sandpiper (female). This and the preceding specimens were all obtained on a grass-plot where chickens feed. A number of Kestrels are on the Lydd Beach. A pair of Grey Phalaropes (immature), secured; the female the smallest I have yet come across. It weighed exactly $1\frac{1}{8}$ oz., the male $1\frac{1}{4}$ oz.

Sept. 26th. Squally. A Grey Phalarope on the midribs. Another was picked up on the sands with one wing torn off. It had evidently flown against the telegraph wire along the sea-wall. A further influx of young Swallows and Sand Martins has taken place. The Swallows seemed tired; many squatted motionless on the grass, now and again hovering over it, after the manner of Kestrels. The Sand Martins were by far the most active. Their flight appeared steady and strong. During the last two weeks Sky Larks have sung at fitful intervals. Their songs now rarely exceed a minute. This morning, however, a Lark, full of exuberant spirits, sang for a period of three and half minutes, in

spite of a chilly south-west wind. Small flocks of Wigeon have begun to steal in to the shallow brackish sheets of water near the shore on soft sibilant pinions. With them have come small "bunches" of Teal, these birds making further inland to sheltered ponds, which have become asylums of the straight-jacketed reeds, and now likewise for them.

Sept. 27th. Strong south-westerly wind; rainy. A Grey Phalarope on the midrips.

Sept. 29th. Fine. A flock of Black-headed Gulls, chiefly adults, on the sands, and with them a few individuals of *Larus canus*, the latter species by no means common here. This community kept separate from the other "gull" companies, which have been greatly swelled of late by the immature *Larus marinus*. On a calm evening, after that large yellow everlasting flower—the sun—has drooped to rest, the Gulls, their supper finished, troop out to sea to seek for places where the lolling swell would rock them to sleep. In bad weather they go far inland for the night, and are on the wing again, flying seaward to the water's edge, ere dawn has come. As shadows of the morning dusk, they pass over the cold brown fields of plough, then high above the village of Lydd, asleep and watched over by her lamps, which become each moment less brilliant, their lights paling with the fog of morning. As grey shadows of dawn they pass over the sand-hills; then, shelving on to the watery sand, they yelp loudly with their hard-throated voices.

Oct. 4th. Very rainy; strong south-westerly wind. Another Phalarope on the midrips, and three Grey Plover on the sands. Five Lesser Terns in company with a flock of Dunlin.

Oct. 7th. Strong south-easterly wind and rainy. Large numbers of Pied Wagtails along the dykes. They are making eastward. Several adult Knots on the Lydd Beach.

Oct. 10th. A very handsome male Fire-crested Wren was shot to-day on a tall apple-tree in a garden near Lydd.

Oct. 12th. The main body of the late broods of House Martins appeared on the coast this morning. They attached themselves in parties to cottages and farm-buildings, in front of which they hovered and circled in a sluggish manner. Several were found perished on the window-sills, while not a few lacked tail-feathers, looking in this state, as they flitted to and fro, more like little bats than anything else. It would not have been

difficult to knock many over with a stick, so weary did they seem, barely possessing enough strength to fly up to the eaves, where they clung, to peer and search in vain for tiny mud-beaded houses wherein to rest, like those they had left only a few weeks back. At length they appeared to realize that the aspect of things had changed, for they took to the tiles, where they huddled together and remained motionless for a time. I pitied these little travellers from the bottom of my heart.

When September was passed, and October had come, migrants became scarce, and silence for the most part reigned throughout this sparsely stone-studded shore. In the neighbouring reed-beds it was now and again broken by a mischief-making wind that sowed discord amongst the waving reeds.

AN ORNITHOLOGICAL TOUR IN NORWAY.

By O. V. APLIN, F.L.S.

A TOUR in Norway, made during the past summer and here described, extended casually over almost the entire length of a country nearly 1086 miles long, and lying between $57^{\circ} 57'$ and $71^{\circ} 12'$ N. latitude. I have therefore thought it desirable, at the risk of a little repetition, to divide the localities in which my observations were made and the birds seen therein into three sections, grouped respectively in Southern, Middle, and Arctic Norway.

I.—SOUTHERN NORWAY.

After a rough passage across the North Sea, with a painful "corkscrew" motion, we were in Christiansand early on the morning of May 31st, 1896. It was Sunday, and the steamer was detained until late in the afternoon, so we had a long walk ashore through wooded country to Ravnedal and Eg. Pied Flycatchers at once arrested our attention on landing. Several were singing gaily in the poplar and other trees in the gardens close to the quay. The tame Magpies, so remarkable in Norway, flying about the town and even perched on the principal buildings, presented a curious sight to a new-comer accustomed to frequent failures in stalking and slaying this shy and wary egg-stealer.

The next morning we reached Christiania, where, thanks to

the kindness of Professor Collett, I was able to spend a considerable time among the excellent and interesting collection of birds in the University Museum. On June 2nd we left for Hamar, on the shores of the Lake Mjösen, where we spent the next day. On the return journey we were in Christiania from June 30th to July 3rd. I treat the country covered so far as Southern Norway, and in these localities I noticed the following birds:—

Turdus merula.—At Christiansand.

T. pilaris.—A pair in the pine woods on the shores of Lake Mjösen were very noisy. One sat on a pine-top chacking as they do here in winter.

Saxicola œnanthe.—On the shores of Mjösen on June 3rd. On July 1st there was a brood of young just out of the nest on the shores of Maridvals Vand, near Christiania. I got very close to them; they had the head tinged with grey, wings and mantle warm dark buff, breast and under parts generally pale buff, darkest on breast and marked on this with dusky.

Pratincola rubetra.—Several at Hamar.

Ruticilla phœnicurus.—Common. Seen at Christiansand and Hamar. At Christiania it is a tame and conspicuous bird about the palace-grounds and public gardens. The young broods were out of the nest on our return, and were wonderfully tame. During a heavy shower I was taking shelter under a tree, when a young Redstart came hopping along to do the same; presently it confidently hopped up and took advantage of my umbrella.

Erythacus rubecula.—Not common, but seen at Christiansand and Christiania.

Sylvia cinerea.—At Hamar and Christiania; a few.

S. curruca.—One at Christiania on return journey, in song.

S. atricapilla.—Fairly common at Christiania; to be heard in the palace grounds.

S. hortensis.—Quite as common as the last-named at Christiania, and three noticed at Hamar.

Regulus cristatus.—Pine woods at Hamar.

Phylloscopus rufus.—At Christiansand. Several were in song near Christiania in the first days of July.

P. trochilus.—Very common at Christiansand, and some at Hamar. The distribution of this bird in Norway is rather curious. On July 1st only a few were noted (more Chiffchaffs)

at Christiania; but they might have been chiefly silent then, for they cease singing in England earlier than the Chiffchaff.

P. sibilatrix.—I heard distinctly the call-note of a male in thick woodland at Eg, near Christiansand, but could not see the bird. According to the list of Norwegian birds in Professor Collett's 'Bird Life in Arctic Norway,' the Wood Wren is only a rare breeder in Norway.

Hypolais icterina.—I hoped to have heard a good deal of the song of the Icterine Warbler, but partly perhaps on account of our limited stay on our way north, and the bad weather we encountered when coming south, I was disappointed. But I cannot think that it was as common as usual in Norway in 1896. At the end of June and in early July I made two long searches for it in suitable localities, and lost no opportunity of listening for it in the well-planted ornamental grounds in Christiania and Trondhjem. Professor Collett told me that it was to be heard in the shrubs at the back of the Museum, but that June 1st (when we were there) was full early for it; we could not hear it on our return, however. Nevertheless, I heard enough of the bird's song to show me that I was probably justified in surmising (Zool. 1896, p. 125) that the birds I found spending the breeding season in North Africa were less imbued with spirit and energy than those which go further north in spring. At Eg, on May 31st, two Icterine Warblers, fighting among some trees, attracted my attention by their loud angry twanging notes of "ty-ink," "ty-yink." One of them presently flew to some low trees and sang, and I wrote down the following note. It was still the same running harsh song that I knew last year, with a "ti-op ti-op ti-op" to start with sometimes. But certainly it was more vigorous, and the bird *did* give vent to some extraordinary and astonishing sounds; whistles, musical repetitions of an Owl's "kee-wak," and one sound well described by the Rev. C. Benson as Parrot-like. Yet, apart from this, I could not call it a fine song, and it had nothing of the Nightingale's song about it.

Parus major.—Feeding young in nest at Christiansand, May 31st. Very common about Christiania, in the town gardens and neighbourhood. Feeding brancher young in early July.

P. palustris.—Small brown examples seen at Christiansand were, I suppose, the typical species, which is included in the list of the birds of Norway. But a specimen so labelled in the

Museum at Christiania, with light brownish back and big black cap, was as big as *P. borealis*, the black cap of which was hardly any larger.

P. borealis.—At Hamar, and in pine woods (July) near Christiania; brownish birds, pale brown rather than grey backs.

Motacilla alba.—Very common; seen in all three localities. At Christiansand, on May 31st, one took food to a nest in a hole in a tiled roof. They were common and wonderfully tame in the public gardens at Christiania. Early in July numbers of young birds (which struck me as browner and more dingy and dusky than those I saw in Switzerland) were to be seen. They perched freely in trees. One evening I saw several fly into some big trees on the ramparts. A male was in song on July 2nd. I satisfied myself that the adult female, as a rule, has no black on the crown or occiput; in some cases there is a little on the latter part. But I propose to enlarge upon this subject, which I touched upon some years ago, in a future article, as I have been able to get together a good deal of information relating to it.

Anthus trivialis. In song at Christiansand.

Lanius collurio.—A male on the telegraph-wires on the outskirts of Christiania on July 1st.

Muscicapa atricapilla.—Singing gaily in the poplars and gardens of Christiansand; common, and in the country also. Common also at Christiania, in the public gardens, notably those of St. Hanshaugen. The bold, bright, and sweet song had usually the Coal Tit-like beginning, "if-he if-he if-he," but I noticed one bird which used only one syllable, "if if if if," and followed it up with the usual "che le wah wah." In July Pied Flycatchers were feeding brancher young in these gardens. I examined these at very close quarters. They were of a brownish grey above, mottled; under parts dirty white, well marked with vermiculations; there was buffy white on the wing and outside of the tail. We saw several adults among the old stunted black and white birches along the shores of Lake Mjösen. The Pied Flycatcher has the same way of flirting its wings as the Spotted Flycatcher.

M. grisola.—Inhabited the hotel-yard at Christiania, where the only vegetation consisted of some plants in boxes, and was, I believe, breeding there. One morning I watched from a second-floor window a Flycatcher very busy tackling a medium-sized

bumble-bee on part of the roof below. For a minute or so the Flycatcher contented itself with giving the bee bites and dropping it; then it took the bee up and banged it against the leads, and finally, after knocking the life out of it, got the bee with some difficulty into its beak, and flew off with it to a higher part of the roof, where doubtless it had its nest. The same day (July 2nd) Flycatchers were feeding brancher young in the botanic garden.

Hirundo rustica.—Certainly not abundant. Noticed at Hamar, but there were a few only about Christiania in July.

Chelidon urbica.—Seen over the Svart-tjern at Ravnedal, near Christiansand, on May 31st. Some nests were built under the eaves of wooden houses on the outskirts of Christiania.

Cotile riparia.—Breeding in sand-pit at Maridvals Vand, Christiania.

Ligurinus chloris.—Only twice seen in Norway, at Christiania. One bird, in a row of trees near the ramparts, had a remarkably fine song, especially the twittering notes, which were quite rich.

Passer domesticus.—Very abundant in Christiania. I expect these birds benefit considerably by the sheaves of corn put out on poles by the people at Christmas.

P. montanus.—I saw two or three about some big trees in the botanic garden at Christiania.

Fringilla cœlebs.—Common birds, especially at Christiansand, where they were very tame, and gave good opportunities of seeing their bright rich colours as they picked insects from the pine-branches. The song seemed slightly different, although the difference is not easy to describe.

Linota cannabina.—A few by the shores of the lake at Hamar.

Emberiza citrinella.—Common. Near Christiansand I noticed them near the edge of, but in, thin deciduous wood, where a female was already carrying food on May 31st.

E. hortulana.—The evening we arrived at Hamar we went for a walk along the shores of Lake Mjösen. In some places the shore was lined with deciduous trees, noticeably a shiny-leaved, white-barked poplar, rowans, and an abundance of bird-cherry just then in full blossom. At other points the pine woods come down to the lake edge. We were collecting plants on a little promontory running out into the lake, and had just renewed acquaintance with the alpine globe-flower, when I caught the song of a bird which was new to me, though I guessed at once

what the singer was. Two birds were singing from a group of pines and other trees on the backbone of the promontory, and it was not difficult to localize their position roughly. But the difficulty of exactly localizing a monotonous and more or less highly pitched sound is notorious. My wife took one bird in hand and I the other, but so closely did they sit that I should think for five minutes or more I could not see mine. At last he left his perch, apparently from the very spot I had been looking at, and flew down into a weedy stubble not yet ploughed. I flushed him, and he went back to his old perch ; and then in a few minutes I made out a male Ortolan, his chestnut under-parts conspicuous in the clear light. Meanwhile my wife had found the other. They were both perched on a pine branchlet near the top of the tree, and were quite exposed ; and it seemed surprising that they were not seen at once. But their habit of sitting quite still is their protection. The next day we saw a good many, and they are evidently quite common in that district, though I saw none anywhere else in Norway. The song, usually delivered from a bough near the top of a tree, but sometimes from the top of one of the tall upright fence-posts, is sweet, leisurely, and mellow. It consists of about four notes, "che che che che" (sweet and high), and then a soft, low "twoh." Sometimes, however, it is varied thus : "Twee twee twee" (low), "chi chi" (high), and then the soft "twoh." I have noticed that in different individual Yellow Buntings their song is varied in much the same way, *i. e.* some birds sing the first part high and the second low, and others *vice versa*. But, so far as I have noticed, the individual Yellow Buntings are consistent, *i. e.* one bird sings in one way only, whereas one of the Ortolans I listened to sang both variations. Each time the Ortolan sings its strain it lifts its head up. The Ortolan is a very sluggish bird, and wherever it may choose its perch, there it will sit and sing its song over and over again ; if disturbed it will often return to the exact spot. The song is thoroughly characteristic of the bird—sleepy, soothing, and rather melancholy ; but it is a sweet song, and the most melodious Bunting's song I have heard, save that of the Saharan Bunting.

Sturnus vulgaris.—At Christiansand. Fairly common, but not so noticeable as in places further north.

Pica rustica.—Absurdly tame. At Christiansand they were

flying about the town, and settling on the principal buildings—fine stone houses erected since the fire. In the gardens of St. Hanshaugen, Christiania, they hopped and walked about as tame as Sparrows. Near Hamar they were nesting in low trees in the gardens and little yards round the farmhouses and cottages.

Corvus monedula.—At Hamar.

C. cornix.—Common, and generally very tame. Commonly seen about ploughed ground, sometimes several together. At Hamar I noticed quite a number in one field. Near Christiania, in July, I got close to three birds which were insecting among the rows of potatoes.

C. frugilegus.—I saw one among a lot of Grey Crows at Hamar. In Prof. Collett's list it is stated that the Rook breeds only in limited numbers in Norway.

Alauda arvensis.—Seen and heard at Hamar, where there is a large amount of arable land.

Cypselus apus.—At Christiansand, and many at Hamar. At Christiania they were screaming round the palace in a blue sky almost fit for Italy, though not quite deep enough in colour.

Cuculus canorus.—Christiansand, May 31st, and at Hamar.

Crex pratensis.—Two heard at Christiansand, May 31st, and one at Hamar.

Totanus hypoleucus.—Two or three along the shores of Lake Mjösen.

Larus canus and *L. argentatus*.—About the landing-stage at Christiansand.

In the University Museum at Christiania I was especially interested in Norwegian examples of *Turdus atrigularis* and *T. fuscatus* (three), and in examples, in nest-dress, of *Cyanecula suecica*, *Otocorys alpestris*, and *Phylloscopus borealis*, descriptions of which one is glad of the opportunity of taking down. The young Shore Larks were so curious that I reproduce my note of their colours: Very dark (nearly black) on the mantle, speckled with white and buff. A band across the breast marked with dusky, leaving a whitish collar from the sides of the neck round to the front.

II.—MIDDLE NORWAY.

On the morning of the 3rd we left by train for Tönset, in Osterdal'en. The railway ascends the valley of the Glommen, and passes through some fine forest scenery. I noticed a wood of by

far the finest birch trees I have ever seen—magnificent tall, straight silver trunks. Tönset, some 220 kilometres from Hamar, was reached at midnight, when it was quite light enough to see the place, and we took up our quarters in a sufficiently comfortable, though rather primitive little hotel, built in the usual style of roughly squared logs. Tönset is 1617 feet above the sea, and at that date the birch trees, except in sheltered spots, were bare, though the leaves expanded rapidly during the next few days. The banks and islets of the Glommen, clothed with birch and willows, were partly flooded, as the second or summer flood was coming down. Tönset is situated at the confluence of the Töenna with the Glommen, and there is a large extent of meadow land in the valley. The sides of the valley are clothed at first with pine-woods, with hummocky ground underfoot, covered with sphagnum, yellow moss, reindeer-moss and other lichens. These woods were at that date almost devoid of birds, save for a few Pied Flycatchers, Tree Pipits, Redstarts, Grey Crows, and Willow Wrens. Higher up, on both sides of the valley, are extensive fir forests; the mountains rise sufficiently high for you to pass beyond the coniferous zone into that of the birch, and out on to the bare fjeld, at that time still heavily blazed with snow-drifts. The fir forests are as a rule far from rich in bird-life, except when you chance upon a colony of breeding Fieldfares, round which the other woodland species always seem to gather. We pushed through the forest on the one side to the fjeld rising nearly 3000 feet on the S.W. bank of the Töenna, and to the Tronfjeld, somewhat higher, on the east bank of the Glommen. The highest peak of the Tronfjeld (5700 feet), a fine rounded pyramid, appeared to us almost entirely snow-clad. There is a fair amount of cultivated ground close to Tönset, chiefly on a low rounded hill lying in the apex formed by the two rivers.

The fir forests are very lovely and fascinating. For they are wild forests, not cared for like the Swiss forests, but ill used, dotted with new and ancient moss-grown tree stumps, and old felled trunks; with trees of all ages and little clearings. The ground, too, is brilliant underfoot with a bright yellow moss, which makes the forest gleam in a curious way. Many of the trees are festooned with streamers of black hairy lichen, perhaps the beard lichen (*Usnea barbata*).

Unfortunately the weather was very wet during our stay here,

and the dull weather and heavy atmosphere had the usual depressing effect on the birds, many of which escaped notice on this account, I have no doubt.

At midnight on the 9th we left for Trondhjem, about 200 kilometres due north, where we stayed two days. The scenery on the way was remarkably fine, especially on the watershed between the Glommen and the Gula, where the line reached a height of upwards of 2900 feet.

Although its position on the warm west coast has given Trondhjem a much milder climate and a far more luxuriant vegetation than Tönset, while its lower situation has, despite its more northern position, given it a slightly different avifauna, I have thought it possible to include the two localities under the same heading. We returned to Trondhjem from Arctic Norway on June 26th, and spent three or four days there. After only fifteen days in the north, it was pleasant to be once more among trees (other than birch) and flowers. Summer was then in its beauty and full luxuriance, like the English summer in mid-June. But instead of the leisurely succession of leafing and flowering which we enjoy, here in the north the time is so short that many of the things that go to make up our procession are crowded in together. This is hardly so remarkable in the very far north, where, although the time is shorter still, there is so much less to happen. At Trondhjem when we returned, while the lilacs in full bloom, the laburnums and the waning rowans reminded us of our mid-May, there were peonies to take us further, and the deep rich crops of flowery meadow hay—some already cut and hanging on the fences erected for it—to tell us it was the end of June.

Turdus musicus.—We met with three or four in the fir forests, at a considerable elevation, singing. Here, as in Switzerland, the Song Thrush is a shy and retiring forest bird.

T. iliacus.—In these forests we became acquainted with the full song of the Redwing. It starts gaily with about five sweet full notes in a descending scale (but not always so, for sometimes the scale is upwards), then goes off into a low running chattering song, after the manner of a Swallow, and not unlike that bird's song; but there are some notes resembling those of a Linnet. This chattering song can only be heard at close quarters, and in nine cases out of ten—perhaps nineteen out of twenty—the run of whistles alone is heard. The Redwing is an extremely shy and

wary bird, and very quiet in its ways in the breeding season, except when it has young hatched.

T. pilaris.—Occasional pairs were to be found in the fir forests, and we came across one fairly large colony some way up the hill-side, where there were a good many young firs, while a clearing close at hand and a rill of water afforded a convenient feeding ground. We came upon the colony in the evening of June 4th, and found the birds very noisy, some of them fairly screaming. They were still building, and we saw a pair outside the forest picking up mud. Two or three nests, possibly old ones, were about fifteen feet from the ground in slender firs. A completed nest, in a young fir not quite six feet from the ground, was very bulky, with thick walls of dead grass and dirty bog-moss, with a lining of mud, still damp, and a very thick inner lining of dead grass. Another half-finished nest, of the same outer materials, was not more than five feet from the ground in the top of a broken birch. The song of the Fieldfare is very rarely heard, at this season, at all events; I only heard it two or three times, and it then consisted of two or three whistling notes, poor in quality, followed by some low, harsh, squeaky, running notes. Near Trondhjem we saw an occasional pair. On the way to the Lerfossen falls a pair attacked and drove off a Grey Crow with angry cries, striking at it again and again. I sometimes saw a pair of Fieldfares feeding out in the little pastures outside the woods. Hewitson wrote:—"Our attention was attracted by the harsh cries of several birds, which we at first supposed must be Shrikes, but which afterwards proved to be Fieldfares, anxiously watching over their newly established dwellings." But I do not think that anybody else who knew the Fieldfare in winter would make such a mistake for a moment. It was this remark of Hewitson's which inclined me to doubt the correctness of his estimation of the song of the Icterine Warbler.

T. torquatus.—At a height of perhaps 600 feet above Tönset, where the firs had given place to the birch, we saw a pair and an odd male. This bird was singing from the top of an outlying fir. The song was a clear, sweet, wild whistle:—"way way way way" or "way-tay way-tay way-tay," followed by two or three stifled, confused, grating notes.

Saxicola œnanthe.—Several at Tönset. Some were pairing.

Pratincola rubetra.—A good many at Tönset and Trondhjem.

Ruticilla phoenicurus.—A good many at Tönset, about the village and lower pine woods. On the 6th, in a bleak wood of low leafless birch trees, on the edge of the fjeld, and at least 2500 feet above sea-level, I found the Redstart; patches of snow still lay on the ground near at hand. At Trondhjem the Redstart was a common bird in gardens about the town.

Erythacus rubecula.—I saw only one, in the luxuriant valley of the Nid, between the two falls, Lille Lerfos and Store Lerfos.

Cyanecula suecica.—Met with only on the Tronfjeld. On June 6th, as we came out of the last of the wood of stunted birches, on exceedingly steep ground, very wet from snow-melt, and emerged on to the fjeld, we passed a great drift of melting snow. All around was bare ground sweeping up to the rounded tops, and undulating a little. The ground was clothed with hummocks of yellow moss, grey lichen, and reindeer moss (*Cladonia*), with here and there some crowberry (*Empetrum nigrum*) and white-flowered cloudberry (*Rubus chamænorus*), and the thin wiry stems of the creeping arctic birch (*Betula nana*), its rounded leaves just bursting from the buds. Grey rocks and bits of white quartz cropped up at intervals. But in a little hollow, holding yet some snow, there was some growth of dwarf willow, and a few stunted birches (both leafless, but their buds bursting) were dotted about among a thick growth of creeping birch. The clouds came flying along, and wrapped us in misty sheets; the wind was cold and searching, and snow patches gleamed coldly. In this dreary spot the Bluethroat chose to pass the summer. We saw this day a pair and a single male. The bright pure notes of the Bluethroat's song drew my attention to a bird sitting in one of the naked weird black-and-white skeleton birches. I had long looked forward to the pleasure of hearing the song, and I was not disappointed with it; it is wonderful. Well may the Laps call the bird "Saddan Kiellinen," or hundred tongues ('Ten Years in Sweden'). The song is very sweet, and its only fault is that it is a little thin and shrill (the same thing may often be noticed in the Robin's notes). Except that it lacks the fulness and richness of tone, it approaches the Nightingale's very closely in some of its parts. The Bluethroat sings too in the fashion of a Nightingale and of a Thrush; that is to say, it repeats a phrase at a time, and gives you time to enjoy each, sometimes repeating it once or twice, and then going off into

another. In the song there is a Nightingale-like high long note repeated several times in the same pitch ; then the song goes off into a little "jug." Then we have " wee wee wee wee wee wee," ascending, or " wirreee wirreee wirreee wirreee," ascending also. Then a Thrush-like " wee-choy wee-choy wee-choy " (high and low), and so on with variations ; and every now and then the little metallic " ting ting ting ting," which has earned for the Bluethroat the name of " bell-bird." Now and then the bird flew up into the air for a little way and descended, Pipit-like, with set wings and outspread tail (showing the rufous-chestnut colour), singing brightly the " wirrreee " or the " wee." Presently, as I watched him, the male of the pair sang in an ecstasy, for his plain-coloured mate, which I could see, was creeping and hopping about among the growth of arctic birch close to where he settled, and he was performing like a Robin. His head and neck were stretched up, and his bill pointed nearly upwards ; his tail was flirted up and down, or held at rather less than a right angle with his body, and his wings were drooped. So he sang until she moved away, and he dashed after her. The next evening, after a wet day, we made our way again to the fjeld, and found another Bluethroat singing in a similar hollow. They had no companions in the bird way up here, save some Meadow Pipits (which always like a dreary scene), Golden Plover, Ptarmigan, and Curlew.

Sylvia cinerea.—Not uncommon at Trondhjem.

S. curruca.—One heard and seen in a clearing dotted with bushes, in the fir forest, some 300 feet above Tönset.

S. atricapilla.—Several in full and rich song in the Nid valley, Trondhjem.

S. hortensis.—One in song in the same locality.

Phylloscopus rufus.—Not observed at Tönset. But, going down to Trondhjem, we fell in with it at Storen ; and in and about Trondhjem it was fairly common and more numerous than the Willow Wren, both at the beginning and end of June.

P. trochilus.—Very common at Tönset, almost the only small bird to be seen in the low-lying thickets along the river ; some in the fir forests. A few only at Trondhjem.

Parus major.—Not seen at Tönset. Numerous at and near Trondhjem ; it is the common Tit there.

P. cinctus, Bodd.—We saw two or three at the upper edge of

the fir forests above Tönset, flitting about some old ragged firs and birches, just where the latter tree began to predominate. The Lapland Tit is a fine plump fluffy-looking bird. The only note I heard was a "schar schar schar."

P. borealis.—The Northern Marsh Tit was occasionally to be seen about Tönset in the fir forest—light grey birds. About Trondhjem, where we saw some in the pine woods on the way to Lerfossen, they were not so white as the birds seen north of the Arctic Circle, or those at Tönset; some of them approached *P. palustris* in colour of the back, but *P. borealis* always seems to be a much bigger bird, with a considerably more extensive black cap.

Motacilla alba.—Very common about the village of Tönset; as only males were to be seen in early June, it is probable that the females were sitting. On the 7th a male was singing beautifully in the intervals of feeding on the midden outside the cow-shed; it was singing even in the rain, which fell nearly all day, and made us glad of a fire of birch logs in the stove. It was a louder and better song than I ever heard from a Pied Wagtail; at times there were quite full, resonant notes, some of them as sweet as a Sky Lark's, and the song was continuous for perhaps ten or fifteen seconds. I often heard the song in Norway, but none so fine as this. The White Wagtail was common at Trondhjem, and the young birds had left the nest on our return at the end of June.

Anthus trivialis.—A few in the lower pine woods at Tönset, also high up, where the birch began to predominate, and two pairs in the high-lying birch wood mentioned in the note on the Redstart. I do not remember seeing the Tree Pipit actually in the fir forest, but this may have been an oversight. At Trondhjem also.

A. pratensis.—Only on the dreary moor-like fjelds, covered with bog-moss, reindeer moss, crowberry, cloudberry, and deep springy moss-beds, made elastic by the stems of the creeping arctic birch; on both sides of the valley. Here it was singing.

Muscicapa atricapilla.—Lower woods at Tönset, and here and there in all the woods, even the highest lying straggling birch wood among the fjelds at a height of about 2500 feet.

M. grisola.—A pair in the fir forest at about 400 feet above Tönset, and others at about 200 feet, but not seen about the

village; and I have no note or recollection of seeing it at Trondhjem.

Hirundo rustica.—A few at Tönset and Trondhjem.

Chelidon urbica.—A good many flying round the house and other houses at Tönset, outnumbering the Swallows. Only a few of either species at Trondhjem.

Cotile riparia.—At Trondhjem, flying over the Nid, and near the town, on both our visits.

Passer domesticus.—Some at Tönset, where a good deal of barley is grown. The people were putting in their seed in the first week in June, and the crop would be ripe in about three months, by which time the autumn snows are near at hand. Many at Trondhjem.

Fringilla cœlebs.—Curiously enough, there were no Chaffinches about the village of Tönset or in the lowest woods; but here and there in the fir forests we came across one or a pair, at a height of about one to four hundred feet above the village perhaps. They were pretty common about Trondhjem, and were singing a fine rich song.

F. montifringilla.—A few pairs about the fir forests at Tönset, especially where the colony of Fieldfares were breeding; for here, as with colonies elsewhere, most of the woodland birds had assembled. The males were in beautiful plumage, and sang their creaking "weeeech" after the manner of a Greenfinch's "tweeee," but more metallic, twanging, and harsh.

Emberiza citrinella.—Lower ground at Tönset; a good many outside Trondhjem.

E. schæniclus.—Several on banks of the Glommen at Tönset. Seen on high ground outside Trondhjem, among low pines, firs, juniper, &c., but not far from some swampy ground.

Sturnus vulgaris.—Common about Tönset village, where boxes are put up for their accommodation, some being arranged in the apex of the gable when the house or shed was put up; in these the birds were nesting in the first week in June. Most of the houses in Tönset were built of roughly squared logs, notched within six inches or a foot of their ends so as to fit into one another at the house corners. There were a few frame-houses. The roofs were chiefly covered with either shingles or turf; on the latter a good crop of grass and weeds was growing. The Starling was pretty common at Trondhjem also.

Garrulus glandarius.—The only evidence of its presence at Tönset was a blue wing-feather picked up in the lower part of the forest.

Pica rustica.—At Tönset hardly ever seen far from the houses and farms, where they hop about on the turf-roofs as tame as town Sparrows. How the people rear any poultry here is a wonder, what with the Crows and the Magpies. But you see few fowls running about, and I think they are kept shut up a good deal, as eggs were fairly plentiful, though until we had lowered the stock they were often uneatably stale. The Magpies here struck me—seen at a few yards distance—as having already more white about them on the wing, and the long white flank-feathers showed more. To be seen even in Trondhjem, and I noticed some big nests in the poplars.

Corvus cornix.—The Grey Crows of Tönset did not go far afield, but sat about on the houses, cowsheds, and in the little yards. I have seen from my bedroom window three at the same time in the grassy enclosure round the hotel, within a few yards of the house. They chiefly seem to breed in a little fir wood at the back of the village. When passing through this we were received very angrily by some birds. It is odd to see a Grey Crow sitting on a fir tree, croaking angrily because you will not go away. I think the Grey Crow's croak is usually a little more highly pitched than the Carrion Crow's, and that when the Grey Crow croaks in a low tone his croak has rather less fulness and volume. In this wood I saw four nests, from one of which a bird flew. Three were about fifteen or twenty feet from the ground, the other about twelve feet. All were in thin-stemmed slippery trees, branchless for some distance, and I could only get up to the lowest. It was a huge mass of sticks, twigs, dead grass, moss, and feathers, but was apparently not quite finished. I have seen the Grey Crow in Trondhjem, perched on a poplar close to the Cathedral.

Cypselus apus.—At Tönset. Good many at Trondhjem. On the 10th they were screaming between eleven and twelve p.m.

Gecinus canus.—Only recognized by its deep note, in the fir forest at Tönset.

Cuculus canorus.—At Tönset.

Anser erythropus, Linn.—As I emerged from a thicket on the banks of the Glommen, near Tönset, I saw, not far off, a Lesser

White-fronted Goose standing in a wet meadow. It was a small dark bird, with conspicuous white front, and some dark colour on the under parts, but not clearly marked. Its head was up, and it rose in a few seconds and went up the river. This is the species which breeds freely in the interior of Finmarken. *A. albifrons* is only a non-breeding visitor to Norway (*vide* 'Bird Life in Arctic Norway').

Lagopus albus.—Happened to flush only three; two of them in upper part of forest,—one of them indeed outside the trees, among some dwarf willow and birch growing by a big snow-drift. This was a warm-coloured male. The other was duller in colour, and had still some white on the back. The third bird, flushed from a similar spot near the edge of the birch wood, was a male, and had the back still splashed with white.

L. mutus.—Flushed one twice at close quarters on the Tronfjeld. On rising the first time, almost at our feet, it uttered a very low "ug ug." There was still a dash or two of white on its grey back. It just matched the grey rocks splashed with quartz. And indeed it was not unlike the snow-banded fjeld, though this had a yellower tint, derived from the yellow moss mingled with the reindeer-moss, &c. Of Reindeer we saw only signs—fresh signs—and in the forest too. The inhabitants of Tönset like to decorate their gables with a pair of bleached antlers.

Charadrius pluvialis.—A soft clear mellow whistle drew attention to a remarkably tame pair on the Tronfjeld. One sat until we got close to it; the other slipped quietly away. We could not find the nest, and it was too miserably wet and cold to lie down and wait. Another single bird was equally tame. They were in splendid plumage.

Vanellus cristatus.—On the evening of the 4th a flock of twenty were wheeling over the flooded Glommen, and settled at last on some ploughed ground.

Totanus hypoleucus.—Two by the Glommen at Tönset, and on the banks of the Nid near Trondhjem.

T. calidris.—Very noisy about the islets in the Glommen.

Numenius arquata.—Heard in the mist on Trondfjeld, and a feather picked up. A pair, noisy with sweet rippling whistles, appeared to be breeding in some open lush grass-fields near Trondhjem.

Sterna fluviatilis.—I saw what I believed to be some of these Terns about Trondhjem Harbour.

S. macrura.—A little party of these were sitting on the big stones of the breakwater at Trondhjem.

Larus canus. *L. argentatus*. *L. fuscus*.

Rissa tridactyla.—A few of these about the harbour; more of the Lesser Black-backed Gull than of the others.

(To be continued.)

NOTES AND QUERIES.

MAMMALIA.

The Stoat: Change of Colour in Winter.—Mr. George B. Corbin's statement in the July issue of this Journal (p. 254) in regard to Hampshire, that the change of colour of the Stoat "takes place in a greater or less degree every winter," is true also of Sussex. Pure white examples are rarely met with, there being almost always some of the ordinary colour remaining, especially about the head: a fact which Mr. Borrer tells me he also has noticed,—W. RUSKIN BUTTERFIELD (St. Leonards-on-Sea).

[See Zool. 1884, p. 102; and 1888, p. 141.—ED.]

Dark-tailed Squirrels.—It is not so unusual to meet with dark-tailed Squirrels in August as might appear from the observations of Mr. Oldfield Thomas (Zool. 1895, pp. 103, 150) and of myself (*supra*, p. 349). At the time of writing I did not bear in mind what Mr. Thomas had written on the subject, or I should have added that although the example I recorded was the earliest to assume the dark tail that I have seen alive, yet I know of many others being killed in Sussex in that month.—W. RUSKIN BUTTERFIELD (St. Leonards). [See p. 401.—ED.]

On the Breeding of *Sorex araneus*.—Bell, in his 'British Quadrupeds,' which is still the standard work on the subject, states that the Common Shrew brings forth from five to seven young ones in the spring. I am, however, inclined to believe that it breeds two or three times during the year. I found a nest on July 9th, in a depression in the ground in a hayfield, over which the reaper had passed without injuring it. The nest was made of pieces of dry grass and oak-leaves, and inside were finer bits of grass and pieces of oak-leaves, all of which had evidently been bitten into small pieces by the Shrew itself. The young were eight in number, and three-parts grown. Again, on Oct. 1st, when out shooting in a second crop of clover, a round ball of grass caught my eye, and on stooping down to examine it I found that it was a Shrew's nest, built in a tuft of the common dog's-tail grass (*Cynosurus cristatus*), and formed by bending the pieces of grass of which the tuft was composed, and twisting them round

into a most compact ball, in which I could discover no hole for ingress and egress. The number of young was five; they were about half grown, and eventually got off safely. The young in the first nest I preserved, and I noticed that three out of the four had white tips to their tails. This peculiarity also obtains in the adult Shrew, but not in nearly so great a proportion, at least that is the case in the adult specimens that I have examined, though of course it may be permanent and last through life.—
OXLEY GRABHAM, M.A. (Flaxton, York).

Greater Horseshoe Bat in Merionethshire.—I have to record the occurrence in Merionethshire of the Greater Horseshoe Bat (*Rhinolophus ferrum-equinum*), on the authority of Mr. Oxley Grabham, who informs me that he took a specimen of this species from a disused mine in the neighbourhood of Penmaenpool. I have failed to meet with this Bat myself, though I have paid much attention to the small mammals of the connty referred to.—G. H. CATON HAIGH (Grainsby Hall, Great Grimsby).

BIRDS.

Macqueen's Bustard in Holderness.—On the 17th Oct. last an example of this Eastern Bustard, *Otis Macqueeni*, a resident in the Aralo-Caspian regions, and from the Caspian to Yarkand and Altai Mountains, was seen in a vetch-stubble behind the warren-house at Kilnsea, near the Spurn. Colonel White, who rents the house as a shooting-box, fired at it, but, apparently, without in any way injuring the bird. On the following morning it was killed in a wheat-stubble in the parish of Easington, by Mr. G. E. Clubley, a farmer of Kilnsea. Mr. H. B. Hewetson, of Leeds, and I, saw the bird a few minutes after it was shot and while yet warm. I then took the following notes:—Length, 28½ in. Flexure, 16 in.; tarsus, 4½ in. Iris, very light straw-colour (not brown, as stated by some authors). Tarsi and feet nearly the same colour (not olive-green). Bill, blackish or slaty, with base of lower mandible yellow; palate black; tongue whitish. A peculiarity of the plumage was that the base of the feathers on the back and breast was for about a fourth of their length salmon-pink; also the down. In a subsequent examination the weight was found to be 3 lb. 11 oz. The feathers on the scapulars and nape are shaded cinnamon and buff, vermiculated, and have very conspicuous broken bands of black, one on the latter, and two or three on the former. The three bars on the tail are greyish black, and the tips of the feathers white. Regarding the habits and appearance of the bird, I am indebted to two of our party, Mr. Wm. Eagle Clarke and Mr. Harry F. Witherby, of Blackheath, who were out for a walk, for the following notes, taken with the aid of powerful binoculars, at the distance of about one hundred and fifty yards. On the wing it looked like a big Owl, and was pursued by small birds; and when it alighted behind a high bank, the Grey Crows hovered above it and

marked the place for its pursuers. It flew low and slowly, just skimming the land. In colour it looked isabelline in body, and conspicuously black and white in wing. In walking it carried the head and neck like a feeding Pheasant, and appeared to spend its time in feeding, washing and preening itself. It walked in a stately fashion, but not with head erect, though sometimes, when alarmed, it stood with neck and head erect, and on the alert, the long black feathers on each side of the neck being very conspicuous. It was fired at several times, and on being flushed never went to any great distance, flying leisurely and heavily to about one hundred yards and then alighting. An examination of the bones on dissection proved it a young bird, and a male; it was very fat. The crest-feathers were not fully developed, white at the base and then black. The stomach was filled with vegetable matter, chiefly the heads (buds and flowers) of ragwort (*Senecio aquaticus*) and fragments of beetles of the genus *Carabus*. Mr. Clarke and I dined off the body; the flesh was very dark and tender, and we came to the conclusion that it tasted like Wild Goose with a savour of Grouse. Macqueen's Bustard has occurred three times in England, all on the East coast, and in October, The first in 1847, on the wold near Kirton-in-Lindsey, Lincolnshire; again, on Oct. 5th, 1892, near Marske, N.E. Yorkshire ('Naturalist,' 1892, p. 373; Zool. 1893, p. 21); and, lastly, the subject of this notice. The bird is at present in possession of Mr. Philip Loten, of Easington, by whom it has been admirably set up.—JOHN CORDEAUX (Easington, Oct. 20).

Purple Gallinule in Hants.—A specimen of the green-backed species of *Porphyrio* was killed on the banks of the Avon on Sept. 15th, no doubt an escaped bird, for the man who killed it remarked that it appeared to be very tame, and one of its wings showed signs of scissors having been used upon it, although it was said that his shots had cut the feathers off. I am not aware that any such water-fowl are kept in this immediate neighbourhood, and yet I do not think the bird could have got upon the wing to have flown here.—G. B. CORBIN (Ringwood, Hants). [See Zool. 1894, p. 427.—ED.]

Cream-coloured Courser in Wilts.—I beg to record a recent instance of the occurrence of *Cursorius isabellinus* in Wiltshire. It was shot by Mr. George Bovill on October 10th, on the downs above Earlestoke, that is to say, on the north-western edge of Salisbury Plain, and within a very short distance of the spot where Mr. Langton killed another specimen at Elston, near Tilshead, on October 2nd, 1855 (see 'Zoologist' for 1855, p. 4913). Mr. Bovill obligingly informs me that the bird was running along the down, but got up and flew as he approached it, when he shot it on the wing. It seemed tired, as if after a long flight, and it is probable that it had been blown across by the heavy gales which prevailed from the south-west for two days previously. It is singular that a second Wiltshire specimen of so rare a visitor to our shores should be met with in the same locality as

its forerunner in 1855. It is also strange that almost all the occurrences of this bird within the British Isles have been in the month of October, when boisterous winds so often prevail from the south-west, whereas the home of the "Cream-coloured Courier" is essentially the east and the south (see Seeböhm's 'British Birds,' vol. iii. pp. 63-4); but I am afraid we are still very far from a knowledge of the causes which bring unexpected stragglers to our shores.—ALFRED CHARLES SMITH (Old Park, Devizes).

[The bird above referred to was forwarded for preservation to Messrs. Rowland Ward & Co. of 166, Piccadilly, who obligingly sent it while still unskinned for our inspection. On placing it in the scales we found it to weigh a trifle over 4½ oz., or the average weight of a Common Snipe.—ED.]

Cream-coloured Courier in Jersey.—When examining, while still unskinned, the Courier which was shot in Wiltshire, as above mentioned, on Oct. 10th last, I little anticipated the subsequent and speedy announcement that another had been obtained in Jersey. I am credibly informed, however, that on Oct. 19th a Cream-coloured Courier was shot in Bouley Bay, Jersey, and was taken to the resident taxidermist there, Mr. Caplin, of Halkett Street, for preservation. These two birds probably left their summer haunts in company, and, encountering the south-western gales which lately prevailed, got blown out of their course and separated *en route*.—J. E. HARTING.

Common Buzzard in Montgomeryshire.—In 'The Zoologist' for October (p. 382) appeared a note on the supposed occurrence of the Honey Buzzard in Hertfordshire. As a matter of fact, the bird in question was obtained on my property in Montgomeryshire, whence I wrote, and not in the neighbourhood of my residence in Hertfordshire. As regards the species, the bird was too hastily identified as the Honey Buzzard, for on more careful examination it has proved to be an example of the so-called Common Buzzard. I will therefore ask you to correct the mistake, which I regret should have been made in print.—F. M. CAMPBELL (Rose Hill, Hoddesdon, Herts).

Changes in Nesting Habits of Birds.—It may possibly interest Dr. R. Williams and readers of his article upon "Curious Experiences in Birds' Nesting" (p. 372) to peruse Mr. Charles A. Keeler's "Evolution of the Colours of North American Land Birds" (Occasional Papers of the California Academy of Sciences, iii. (San Francisco, Jan. 1893, p. 39), in which most interesting treatise references are made to the subject *loc. cit.* Many similar instances of these changes could be given; and I think a carefully accumulated collection of such as are ascertained facts would prove valuable as an aid to study of the theory which has been advanced of "*inheritance of acquired characters*." A starting point might be made by Dr. Williams or others of your correspondents (or by yourself, Mr. Editor, if you think it of sufficient interest), by publishing a series of quotations

from authors touching upon it, and a bibliography of the subject.—J. A. HARVIE BROWN (Dunipace, Larbert, N.B.).

Nansen's Discovery of the Breeding Haunts of Ross's Gull.—The 'Daily Chronicle' during the past few days has given us the first connected narrative from the pen of the "Hero of the White North." This account of the greatest adventure of the century, or perhaps of all time, in the fields of Polar research contains information long desired by ornithologists. To wit, the discovery of a breeding station for the rare circumpolar Gull, *Rhodostethia rosea*, Macgillivray. The small group of islands where Nansen discovered Ross's Gull in considerable numbers and evidently breeding, lies by his observation in $81^{\circ} 38'$ N. lat. and 63° E. long. Reference to the map at the commencement of vol. ii., 'New Lands within the Arctic Circle,' by the celebrated explorer Julius Payer, shows that the group, named Hirtenland by Nansen, is situated about thirty-two geographical miles due east of Freedom Island, the latitude of which is doubtless accurately determined by Payer, who during his memorable sledge-journey up Austria Sound passed within eight miles of it. Apparently the Hirtenland group of Nansen occupies a position within an area laid down by Payer as Wilczek Land,—proof of the difficulty in charting untrdden lands in the Polar Regions. In this instance, a supposed continuous coast-line, laid down by so experienced and careful an observer as Payer, on closer acquaintance resolves itself into groups of glacier-covered islands. Mistakes in the determination of land by optical vision may easily be made in those fog- and snow-obscured regions. It seems to me not improbable that the members of the Jackson-Harmsworth Expedition may attempt to reach the Hirtenland group next spring, so that it is within the bounds of possibility that next year we may see for the first time the eggs and young of one of the rarest, and in its distribution one of the most remarkable, of birds.—H. W. FEILDEN (Wells, Norfolk).

Occurrence of *Phylloscopus viridanus* in Lincolnshire.—During the afternoon of Sept. 5th I shot a specimen of *Phylloscopus viridanus* in a hedge near the sea-bank at North Cotes, on the Lincolnshire coast. According to Herr Gätke, this species has appeared three times on the island of Heligoland, but has not occurred elsewhere in Europe. It is a native of Central Asia, breeding in Turkestan and wintering in India. In general appearance it closely resembles our common Willow Wren, but has a conspicuous wing-bar formed by the yellowish buff tips of the greater wing-coverts. It is also somewhat greener on the upper parts, and less yellow beneath. It further differs in the proportionate lengths of the wing-feathers, and in the colour of the legs, which are almost as dark as in the Chiffchaff. The specimen obtained by me proved to be a female, and, I believe, adult. The weather prevailing at the time of its appearance was such as usually results in a great immigration of small birds. The wind

backing to the east on the night of Sept. 3rd, and blowing a fresh breeze from that quarter on the 4th and 5th, with heavy rain commencing to fall on the afternoon of the 4th, and lasting without intermission for twenty-four hours. On the 5th all the hedges near the coast were full of small birds, including Pied Flycatchers in considerable number, Redstarts, White-throats, Garden Warblers, &c. I have only to add that Mr. Howard Saunders and Dr. R. B. Sharpe kindly examined and identified the bird for me, and it was subsequently exhibited at a meeting of the British Ornithologists' Club on Oct. 21st.—G. H. CATON HAIGH (Grainsby Hall, Great Grimsby).

MOLLUSCA.

Distribution of Worm-eating Slugs.—I am desirous of obtaining living specimens of worm-eating slugs (*Testacellæ*), so as to add to the records I have of the distribution of these animals in the British Isles, and which I hope to be soon in a position to publish. I take this opportunity of thanking correspondents for the trouble they have taken in procuring examples of slugs, and of expressing my gratitude to those editors who so kindly made known my wants last year.—WILFRED MARK WEBB ("Ellerie," Crescent Road, Brentwood, Essex).

SCIENTIFIC SOCIETIES.

LINNEAN SOCIETY OF LONDON.

Nov. 5th, 1896.—Dr. GÜNTHER, M.A., F.R.S., President, in the chair.

Messrs. A. B. Freeman Mitford and William Tyson were elected, and Messrs. Vernon H. Blackman and Percy Groom were admitted, Fellows of the Society.

Dr. Morris, C.M.G., exhibited specimens and slides illustrating the occurrence of raphides in the bulbs of the common hyacinth of gardens (*Hyacinthus orientalis* and varieties). Forms of eczema were said to have been produced while handling and cleaning these bulbs. Although the fact was familiar to gardeners, the cause did not appear to have been clearly traced. Experiments and observations at the Jodrell Laboratory at Kew, had shown that both dry and moist scales were capable of producing considerable irritation in certain cases when applied directly to the skin. There was little doubt that the raphides were the prime agents. These needle-shaped crystals (composed of oxalate of lime) varied from $\frac{1}{100}$ th to $\frac{1}{200}$ th of an inch in length, and were arranged in close bundles, easily dispersed by rubbing the dry scales. In the growing plants they were doubtless protective, as snails, for instance, avoided hyacinth bulbs, but attacked others growing close by. Roman hyacinths (var. *albulus*) were understood to cause greater irritation than other varieties.

Dr. D. H. Scott described some experiments which he had tried, tending to confirm the conclusion that the irritation of the skin produced by contact with the bulb-scales of hyacinths is due immediately to puncture by the numerous raphides.

On behalf of Dr. H. B. Hewetson, of Leeds, Mr. Harting exhibited photographs of a specimen of Macqueen's Bustard (*Otis Macqueeni*), which had been shot at Easington, in Holderness, on Oct. 17th last, and gave a brief account of the species, which had now been met with in England for the third time; the first instance of its occurrence having been noticed in Lincolnshire in October, 1847, and the second at Marske, N.E. Yorkshire, in October, 1892.

Mr. Hugh Warrand exhibited a remarkable bird which was believed at first to be a hybrid between the Red Grouse and Ptarmigan, but which, in the opinion of Mr. Ogilvie Grant, Mr. Millais, and Mr. Harting, could only be regarded as an abnormally pale-coloured Grouse. Only one possible instance had been recorded of such a hybrid as was suggested, *viz.* in the case of a bird which was exhibited some years ago by Prof. Newton to the Zoological Society (P.Z.S. 1878, p. 793), and had since been figured by Mr. Millais in his work on Game Birds (pp. 181, 182). See also Chamberlain, Zool. 1892, p. 41.

A specimen of the Cream-coloured Courser (*Cursorius isabellinus*), an extremely rare visitor to this country from North Africa (probably *via* Spain), which had been shot on Salisbury Plain, at Earlstoke, on Oct. 10th last, was exhibited by Mr. Harting, who gave particulars of the occurrence, and stated that another example of this bird had since been obtained in Bouley Bay, Jersey. (*Vide ante*, p. 435.)

A paper by Mr. A. W. Waters, F.L.S., on Mediterranean Bryozoa, was then read on his behalf by the Zoological Secretary. Dealing in the first place with some *Cellulariidae* and other Bryozoa from Rapallo, the paper was to some extent a revision of a work already published on Mediterranean Bryozoa. Stress was laid upon the importance of noting the position from which the radicle-tube grows, and this was found to be a character of specific value. The way in which articulation takes place is another character of importance, and it was shown that there are two distinct kinds of articulation in the *Cellulariidae* which might be used in establishing generic divisions. The complicated stalk of *Childonia Cordierii*, Aud., was described, and comparisons made with the stalks of *Stirparia*. Ovicells on the top of the "erect tube" of *Aetea* were recorded for the first time, and as a "tribus" *Inovicellata* had been created for the *Aeteidae*, it was shown how precarious it is to base classification upon the absence of a character.

Dr. S. Schönland communicated a paper on some new species of *Crassula* from South Africa, which he had obtained from localities which

had been very rarely visited by botanical collectors, and which were believed to be undescribed.

A revisionary Monograph of the New Zealand Holothurians, by Prof. A. Dendy, D. Sc., F.L.S., of Christchurch, N.Z., was read. New species of the genera *Cucumaria*, *Colochirus*, and *Psolus* were described. *Echinocymus alba* (Hutton) and *Thyone brevidentis* (Hutton) were shown to be referable to *Colochirus*. *Thyone caudata* (Hutton) and *Thyonidium rugosum* (Théel) were shown to be identical with *Thyone* [*Pentadactyla*] *longidentis* (Hutton), and *Stichopus sordidus* (Théel) was shown to be *Holothuria mollis* (Hutton), which is in reality a *Stichopus*. Seventeen species were in all admitted, four being doubtful, and four provided with overlapping plates. The general anatomy was described wherever desirable. The cœlomic fluid of *Candina coriacea* was shown to contain two distinct types of colourless corpuscles, and in addition numerous brownish red corpuscles, akin to those observed by Howell in a *Thyonella*. A "dichotomously foliaceous" order of spicule, apparently of the type recorded by Bell for *Cucumaria inconspicua*, was found to exist in various degrees of modification in *Stichopus mollis*; and details were given of the growth processes of the "wheel" in *Chirodota dunedinensis*, having interesting bearings upon the observations of Ludwig, Chun, Kishinouye, and others.

The Rev. J. Whitmee made some remarks on the Trepang fishery in Samoa, where several edible species of Holothurians are gathered and prepared for the market, and called attention to what he conceived to be a little-known fact, that a small fish of the genus *Fierasfer* lives parasitically in the body of the Holothurian. Some further account of the fish was given by the President.

ENTOMOLOGICAL SOCIETY OF LONDON.

October 21st, 1896.—Prof. MELDOLA, F.R.S., President, in the chair.

Mr. J. J. Walker, R.N., exhibited a specimen of *Emus hirtus*, L., taken at Gore Court Park, Sittingbourne, Kent, on May 30th last.

Mr. W. B. Spence sent, from Florence, for exhibition, some specimens of a cricket, *Gryllus campestris*, in small wire cages, which he stated were, in accordance with an ancient custom, sold by the Italians on Ascension-day.

Mr. F. Enock exhibited a specimen of the curious aquatic Hymenopteron *Prestwichia aquatica*, female, which Sir John Lubbock first captured in 1862, but which had not been recorded since that date until its rediscovery in May, 1896. Mr. Enock said that the male had remained unknown until June last, when he captured several swimming about in a pond at Epping. The male was micropterous, and, like the female, used its legs for propelling itself through the water.

Mr. Tutt exhibited a beautiful aberration of *Tephrosia bistortata* (*crepuscularia*), in which the ochreous ground colour was much intensified, and the

transverse shade between the median and subterminal line was developed into a brown band; the transverse basal, median and subterminal lines on the fore wings, and the median and subterminal lines on the hind wings, being strongly marked in dark brown. It was taken by Mr. J. Mason at Clevedon in March, 1893. Mr. Tutt also exhibited the cocoons, pupal-skin, and aberrations of the imago of *Zygæna exulans*. The cocoons were spun upon one another, five in a cluster, and Mr. Tutt stated that the species was exceedingly abundant in the pupal and imaginal stages during the first week of August on the mountain slopes above Le Lautaret, in the Dauphiné Alps, at from 7000 to 9000 feet elevation.

Dr. Sharp exhibited a lepidopterous insect that had been alluded to in the 'Entomologist's Monthly Magazine,' Sept. 1896, p. 201. It was a caterpillar which had received the eggs of a parasite on the anterior part of the body; the abdomen, nevertheless, went on to the pupal metamorphosis, while the head and thorax remained attached to it in the caterpillar stage. He also called attention to some peculiarities in the pupa of *Plusia moneta*, pointed out to him by Mr. Fleet; in this species the pigmentation varies greatly in extent, and is sometimes entirely absent.

Mr. Blandford called attention to the recent discoveries relating to the Tsetse fly, made by Surgeon-Major Bruce in Zululand, which proved that this insect affected animals by infecting them with a parasitic Protozoon. The parasite was communicated from wild animals to domestic animals, and was probably more widely distributed than was generally believed, it or a closely allied form having been found in India and England in sewer rats. Surgeon-Major Bruce had proved that the Tsetse fly was pupiparous, which was of importance as affecting the classification of the Diptera.

Mr. C. G. Barrett exhibited the pupa-skin, cocoon, and eggs of *Hesperia comma*, L., found on chalk hills near Reading by Mr. A. H. Hamm. He also exhibited a series of both forms of *Tephrosia crepuscularia* and *T. biundularia*, showing an unbroken line of variation from brown to white and also to grey and black. In addition he showed several second-brood specimens of both forms obtained in the past summer by Mrs. Bazett, of Reading.

Mr. Tutt read a paper "On the specific identity of *Cænonympha iphis* and *C. satyrion*," and exhibited a long series of specimens.

The Rev. T. A. Marshall communicated a paper entitled "A Monograph of British Braconidæ. Part VII."

Mr. T. D. A. Cockerell communicated a paper entitled "New Hymenoptera from the Meilla Valley, New Mexico."

Mr. E. Meyrick contributed a paper "On Lepidoptera from the Malay Archipelago."

Dr. Sharp read a paper, by Mr. G. D. Haviland and himself, entitled "Termites in Captivity in England." — H. Goss and W. W. FOWLER, Hon. Secretaries.

